

WATER AND CONFLICT IN THE MIDDLE EAST

**A MONOGRAPH
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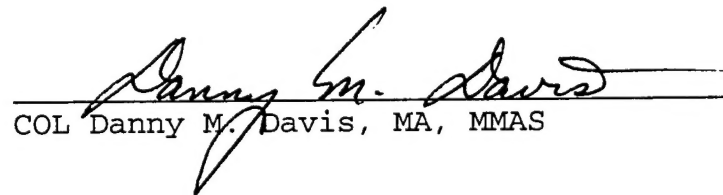
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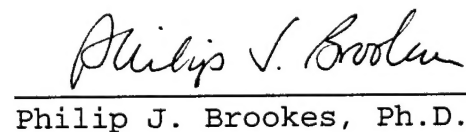
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ABSTRACT

WATER AND CONFLICT IN THE MIDDLE EAST by MAJ Stephen M. Woolwine, USA, 50 pages.

This monograph assesses the potential for conflict in the Middle East as a result of water scarcity. It is guided by the Homer-Dixon model linking the contributions of environmental scarcity to violent conflict.

The monograph begins with a general overview of the water scarcity issue in the Middle East. It then examines the analytical framework developed by Homer-Dixon to gain an understanding of the contributions of decreasing quality and quantity of renewable resources, population growth, and unequal resource access to the development of environmental scarcity. The framework is further used to establish the linkage between environmental scarcity and the outbreak of violent conflict.

With an understanding of the relationship between environmental scarcity and violent conflict developed, the monograph investigates the three major Middle East water scarcity regions of the Jordan, Tigris-Euphrates, and Nile river basins. Investigation of these three basin regions focuses on the factors of water quality and quantity, population growth, and water access. Additionally, history of water related conflict in each basin is also reviewed. The monograph concludes with an assessment that the Jordan river basin is the region most likely to experience violent conflict in the future as a result of water scarcity.

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CHAPTER 1

INTRODUCTION

The availability of fresh water has direct impact on food and energy production, development of industry, and human survival. Fresh water resources are often unevenly divided and irregularly distributed throughout the regions of the world. As populations in the world continue to increase, particularly in water scarce regions, the potential increases for conflict to develop over competition for water. This monograph will attempt to identify the most likely region in the Middle East to experience violent conflict as a result of water scarcity.

Concern over the dwindling water supplies in the Middle East has been labeled as the next source of conflict in the Middle East. In 1985, as Egypt's Minister for Foreign Affairs, UN Secretary-General Boutros Boutros-Ghali warned, "The next war in the Middle East will be fought over water, not politics."¹ Reflecting this prominent role of water in the Middle East is the following statement by Mubarak Awad, director of Nonviolence International, a Washington-based organization supporting the peace process between Israel and the Palestinians: "Water is even more critical than Jerusalem...people can live without Jerusalem, but we cannot live without water."² In 1995, World Bank Vice President Ismail Serageldin took a more global view towards water and conflict stating, "many of the wars of this century were about oil, but wars of the next century will be over water."³ Supporting Serageldin's projection is an estimate that by 2050, the world's population will be number nearly 10 billion with approximately 4.5 billion of these living in 58 countries with water shortages.

The role of water in conflict is not a new phenomena. Water has been used as both an offensive and defensive weapon in conflict throughout history. In 689 BC, Sennachreib of Assyria destroyed Babylon, paying particular attention to the destruction of the water-supply canals supporting the city.⁴ But, one must look no further than the present century to observe this role of water in conflict. During WWII a number of hydroelectric dams were bombed, and in the Korean War the dams on the Yalu River serving North Korea and China were also attacked. U.S. attacks during the Vietnam War also targeted the water supply systems of North Vietnam, in an effort to reduce the north's ability to sustain the war effort.

Water played an interesting role in the relations between North and South Korea in 1986. The North Koreans announced plans for the construction of a hydroelectric dam on a major tributary of the Han River. The dam was seen by South Korea as a significant threat to its security. Water built up behind the dam could be released and the flow was predicted to have the capability of raising the level of the Han in the Seoul area by over 50 meters. As a result, much of the city would likely be destroyed. Construction of the dam was halted, but the critical role of water in conflict is clearly seen.⁵

The severity of the water issue in the Middle East is a key strategic issue in understanding future security decisions within the region. Nations in the region have many ongoing disputes, but few are more basic and deep-rooted as the need for water. After all, the human body can survive without oil, but the soul requires the font of living

waters for survival. An understanding of the magnitude and scope of the water issue will better prepare an analyst or decision-maker to anticipate events in the region.

The fight, or expected fight over water in the region is not a new one, but recent increasing demands and limited efforts in improving the overall supply have magnified the problem. As a result, hydropolitics is a provocative and exacerbating source of grave conflict within the Middle East Region.

To better understand the water issue, consider: two-thirds of all Arabic speaking people in the region depend upon water that originates in non-Arabic speaking areas; two-thirds of Israel's freshwater comes from the occupied territories or the Jordan River; and one-quarter of the Arab people live in areas entirely dependent on non-renewable ground water or on expensive, desalinized water seawater.⁶

The freshwater potentials of the region provide stark realism to the water situation. In 1990, the US had a freshwater potential of 10,000 cubic meters (2.6 million gallons) a year for each citizen, Iraq had 5,500, Turkey had 4,000, Syria 2,800, Egypt 1,100, Israel 460, and Jordan a meager 260.⁷ Even in the water scarce Middle East, it is evident that there are have's and have not's. When one lives in an arid environment, water is power.

The relationship between water and conflict in the region can be seen even as recently as the Persian Gulf War, a war greatly fought over maintaining a free flow of oil. Before withdrawing from Kuwait, Iraqi forces destroyed a considerable portion of Kuwait's extensive desalination facilities. Additionally, large quantities of oil released into the gulf by the Iraqis threatened desalination facilities throughout the region.

Coalition destruction of Baghdad's water and sanitation system caused significant problems for the Iraqis.

As previously mentioned, nations in the region share more political conflicts than just water, to include religious differences, ideological disputes, border disputes, and economic competition. These tend only to complicate the water problem further. Cooperation in the region is a very significant problem. Nations are constantly afraid of another gaining an advantage from an agreement of any type. Nations in the region, as a result, are blinded by preoccupation with autonomy, power, and security.

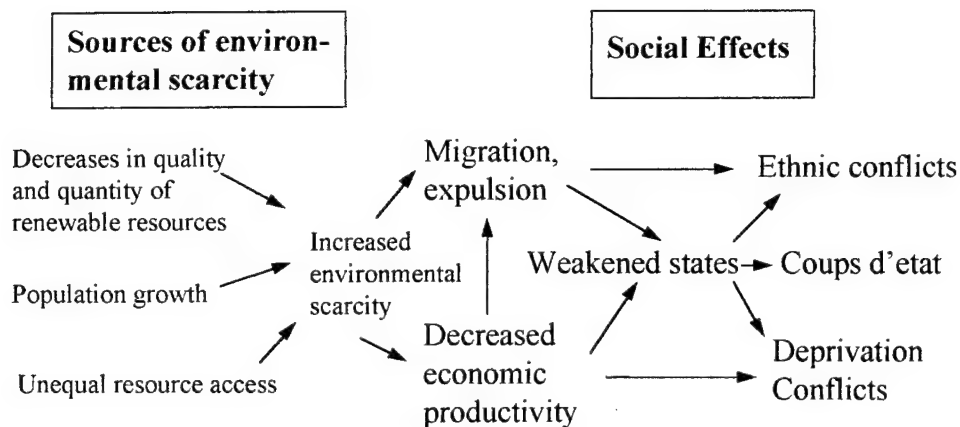
The monograph will use the Homer-Dixon model, described in his article "Environmental Scarcities and Violent Conflict" in the Summer 1994 edition of *International Security*, to evaluate potential conflicts in the Middle East from a water standpoint. The model addresses the contributions of decreasing quality and quantity of renewable resources, population growth, and unequal resource access to the development of environmental scarcity. The model then links the role of environmental scarcity to the development of violent conflict.

After describing the methodology and results of the Homer-Dixon model, the monograph will investigate water issues within the Jordan, Tigris-Euphrates, and Nile river basins. The application of the model against these case studies will provide the evidence for evaluating the issue of water as a source of conflict in the Middle East.

Homer-Dixon Framework

Thomas F. Homer Dixon is Assistant Professor of Political Science and Director of the Peace and Conflict Studies Program at the University of Toronto. From 1990 to

1993, he was the co-director and leading researcher of the Project on Environmental Change and Acute Conflict. The principal focus of the project was to evaluate the role of environmental scarcity in acute conflict. The three year study arrived at the conclusion that in fact environmental scarcity does lead to violent conflict. The table listed below summarizes the findings of the project and will provide the framework from which the



three case studies will be evaluated. As is evident from the table, the Project considers three factors contributing to the development of environmental scarcity: decreases in quality and quantity of renewable resources, population growth, and unequal resource access.⁸

The issue of decreasing quality and quantity of renewable resources addresses the impact of environmental change resulting from human acts. Key to the impact of this

monograph is Homer-Dixon's finding that "degradation and depletion of agricultural land, forests, water, and fish will contribute more to social turmoil in coming decades than will climate change or ozone depletion."⁹

Population growth only exacerbates the problem of decreasing quality and quantity of renewable resources. The balance of supply and demand is placed under extreme pressure by population growth. To gain an appreciation for the impact of population growth consider that it took 130 years for world population to grow from one billion to two billion, but it will take just a decade to climb from five billion to six billion.¹⁰ To further complicate the matter, more than 90% of the added billion will live in the developing world.¹¹ This will place increasing demands on a structure unprepared for the escalation.

The last factor contributing to resource scarcity identified by the project, unequal resource access, negatively impacts the supply side of the balanced supply and demand equation. Unequal access prevents the consumer from achieving the resource requirement necessary to meet demands. Homer-Dixon's research concludes that the renewable resource most likely to stimulate interstate resource war is river water.¹² This point provides considerable validity to the application of the framework to the case studies to be addressed by this monograph.

Because river water flows across international boundaries, the possibility exists for one nation's access to be effected by the actions of another. The competing interests of upstream and downstream riparian fit nicely into the framework's last factor of unequal resource access.

The framework resulting from the project's three year effort provides a synergistic application of three factors contributing to resource scarcity and the development of violent conflict. To summarize the interaction of the three factors, "reduction in the quantity or quality of a resource shrinks the resource pie, while population growth divides the pie into smaller slices for each individual, and unequal resource distribution means that some groups get disproportionately large slices."¹³

Returning to the framework, environmental scarcity as described above leads to two scenarios on the path to conflict. First, decreases in the quality and quantity of renewable resources, population growth, and unequal resource access react together to reduce the economic productivity of a region or nation. The impact of environmental scarcity may be sufficiently severe to threaten the security of a nation and lead directly to deprivation conflicts. This route through the framework is especially applicable when actors take action to improve the distribution of resources in their own favor. A more indirect route to conflict from a reduction in economic productivity, is through population shifts resulting from the movement of the effected population in search of improved living conditions. This migration can directly contribute to the development of ethnic conflicts within a region as ethnic groups compete for the available resources and quality of life issues.¹⁴

Migration and the decreased economic productivity resulting from environmental scarcity work to greatly increase the political and economic pressures placed on the state. To address the resource scarcity issues the state must commit large sums of money on industry and infrastructure. If water is the scarce resource and agriculture assumes a

large proportion of the available water, the government must develop other vocations for farmers or put great effort into water development projects. The ability of the government to deal with the scarcity issues will have a considerable impact on its ability to sustain legitimacy as a ruling body. As the state weakens the conditions ripen for non-governmental actors to intercede violently in their own behalf, leading to ethnic conflicts and possibly a coups d'etat.¹⁵

An additional route to conflict resulting from the increase pressure on the government brought on by environmental scarcity is through the development of hard regimes. In an effort to maintain control of the populous the state can transform itself into a harsh, intolerant, authoritarian, and militarized regime. Within this scenario the regime may choose to take military action in an effort to deflect attention from its internal economic problems. It is also quite possible that military action could be directed towards relieving the environmental scarcity problem in itself, that is environmental resources becoming the objectives of military operations.¹⁶

With the path from environmental scarcity to conflict established, it is now appropriate to discuss the two routes the project identified to prevent scarcity leading to conflict. Both routes rely heavily on social and technical ingenuity for conflict prevention. First, in an effort to relieve pressure on scarce resources, societies must use their resources more efficiently and find alternate employment for those most effected by the limited resource access.

For example, economic incentives like increases in resource prices and taxes can reduce degradation and depletion by encouraging conservation, technological innovation, and resource substitution. Family planning and literacy campaigns can ease population-growth induced scarcity. Land redistribution and labor-intensive rural industries relieve the effects of unequal access to good cropland.¹⁷

The second strategy the project developed for conflict avoidance was for the country to decouple itself from the reliance on the scarce resources by developing alternate goods and resources using readily available resources. This effort would clearly require considerable upheaval within the country's economic infrastructure and require a significant amount of time to effect the problem.¹⁸

As mentioned previously for either strategy to be effective a considerable amount of social and technical ingenuity must be present within the country. Technical ingenuity would allow for the exploitation of other more abundant resources such as using nuclear power instead of oil or desalination rather than underground aquifers. Social ingenuity would provide organizations and institutions which would attempt to insulate the society from the negative impacts of the environmental scarcity, typically setting the stage for exploitation of technical ingenuity. If social ingenuity fails to insulate society from the resource effects, the time necessary for effective technical ingenuity will not be available and the conditions for conflict are ripe.

With the Homer-Dixon framework outlining the linkage between environmental scarcity and violent conflict established, the monograph will now investigate the three case studies in the Middle East in an effort to assess the likelihood of conflict from a water scarcity standpoint.

CHAPTER 2

THE JORDAN RIVER BASIN

The first issue to face in understanding the severity of the water problem in relation to the Jordan River, is how little water the river actually holds. By world

standards the Jordan River is but a stream. Its total discharge, between 1,200 and 1,800 million cubic meters (mcm), is equivalent to about 2 percent of the annual flow of the Nile and 6 percent of the Euphrates.¹⁹ As meager as the river's flow may seem, it is extremely critical to the countries that draw upon its waters.

Despite the meager flow of the Jordan, it retains extreme importance for the nations of Jordan, Syria, Israel and Lebanon. Together these nations share the river's 350 km flow. The Jordan River rises in the hills and mountains of eastern Lebanon. As it flows south, the Jordan is fed by a number underground aquifers, small rivers and streams at a number of points in Jordan, Israel, Syria, and Lebanon. The river continues south to form the border between the Israeli-occupied West Bank and Jordan. The Jordan's principal tributaries are the Hasabani River, that flows from Lebanon into Israel; the Yarmuk River, which rises near the Golan Heights and flows south between the Golan Heights and Jordan; the Baniyas River, originating in Syria; and the Dan River that rises and flows inside the borders of Israel. The quality of the Jordan River water is very good up to the point it reaches the Sea of Galilee, but by the time it terminates into the Dead Sea the water is too salty for use.

The quality of the Jordan River water is greatly impacted by the fact that much of its flow is below sea level and many of the small tributary streams must first pass through the salty remains of ancient seas. The headwaters of the Hasbani, Banias, and Dan have a salinity of 15-20 parts per million (ppm), but by the time the Jordan reaches the Sea of Galilee the salinity level reaches 340 ppm.²⁰ By the time the Jordan reaches the Dead Sea the salinity reaches a level of 250,000 ppm, or seven times that of an ocean.²¹

History of Conflict in the Basin

Water related conflict between Israel and its Arab neighbors began soon after the 1949 armistice agreement that ended the 1948 Arab-Israeli War. The 66.5 square mile demilitarized zone along the Israeli-Syrian border remained quiet for the first few years. However, tensions were heightened in the area in February 1951, when Israel began a water project to drain the Huleh lake and marshes in Upper Galilee in an effort to increase the flow of the Upper Jordan into Israel. Firefights between Israeli and Syrian troops, air attacks by the Israeli Air Force, and ongoing questions and debates in the UN were the result of the Israeli effort.

The Huleh Marsh incident laid the ground work for future conflict surrounding water in the region. The Arabs became aware of the problems of an upstream neighbor having control of the water flow, and also realized that one way to limit the expansion of the Jewish state was to limit its supply of water. Israel on the other hand realized that that to expand their Jewish to meet its grand plans, would require an expanded water share from which to draw from. Water had become a serious security issue in the region. Between 1951 and 1967, “in addition to hundreds of minor clashes between Arab villagers and Israeli engineers, Israeli and Syrian soldiers, and guerrillas of both sides, there were eleven identifiable incidents...three of which required international intervention to prevent a conflict.”²²

Included in this string of events was an attack against Israel in 1965 by a small guerrilla force from al-Asifah, the fighting arm of Yasser Arafat's Fatah group. The guerrillas infiltrated into Israel armed with explosives and destroyed an Israeli water

pumping station. This effort by the PLO brought Israel realization that the Arab world understood Israel's critical vulnerability, water.

The 1967 Arab-Israeli War was fought at least partly over water. During the early 1960's the Arab League attempted to divert the headwaters of the Jordan into Arab rivers. To support this concept is a statement made in 1965 by Israeli Premier Levi Eshkol that, "water is a question of life for Israel" and as a result "Israel would act to ensure the waters continue to flow."²³ During the 1967 War, Israel captured territory surrounding the headwaters of the Jordan, ensuring themselves a reliable water supply and denying a significant portion of Jordan's access. Today some thirty-three percent of Israel's total water supply originates from territories captured in the 1967 War.²⁴

Israel's invasion of Lebanon in 1982, although according to Israeli accounts the purpose was to silence Palestinian guerrillas, quite possibly was inspired in part by water. The territory occupied by Israel gave them access to the Litani River. The fact that Palestinian forces attacking Israel from other nations in the region were not attacked lends some credence to water being an issue in the occupation. The fact that Israeli sources have frequently discussed two key issues for their withdrawal from southern Lebanon, demilitarization and the use of water from the Litani, also provides validity to the role water played in the occupation.²⁵

Clearly water has already played a key role in conflict in this region. To gain a better understanding of the possibilities for future conflict in the region, it is now appropriate to investigate by country the water scarcity issues that currently exist in the region.

Israel

Israel's water resources are not favorably located geographically to support the country. Water is most plentiful in the north and northeast regions of the country, however the predominance of the population, industry and irrigatable land are in the central and coastal plains regions. Additionally the arid south has seen considerable development, further magnifying the water problem.

Streamflow of the Jordan and water runoff are at their peak in the winter months in Israel, however consumption rates are at their peak in the irrigation seasons of July and August. The Jordan is only capable of supplying Israel less than one-third of the country's total demand.²⁶ As a result the predominance of Israel's water comes from groundwater. Significant increase in population and irrigation since the creation of the state of Israel have put a serious demand on the limited resource of groundwater. By 1989, population had quadrupled, but water consumption had increased more than eight times.²⁷

As a result of the increased water demands in Israel, the groundwater has been overexploited, diminishing its quality and endangering its future availability. Overdrawing on the groundwater supplies produces irreversible damage. Israel has been over-pumping groundwater since 1970, and it is reported that since 1980, Israel has over-pumped as much as 200 mcm on an annual basis.²⁸ As the levels of the groundwater are lowered, the potential exists for seawater invade the groundwater, causing salination to take place.

An interesting fact related to Israel's water problems, is centered around its use for agricultural efforts. The agricultural sector supplies 5 percent of Israel's gross national product (GNP) and accounts for only some 2.7 percent of its employment, but drains more than 70 percent of the country's water.²⁹ This is not an acceptable proportion when water is so scarce a resource.

A positive factor for Israel in the water scarcity arena is that they have the lowest natural population growth rate in the region. Currently their natural population growth rate is 1.7 percent, however immigration of Jews from the former Soviet Union (projected to be in the area of 500,000 since 1987) threatens this low growth.³⁰

Israel has taken the lead in technological initiative in the region in dealing with the water scarcity issue, as it has made great efforts in the areas of irrigation and sewage recycling. It has been reported that their water usage rate is little changed from 1967 levels.³¹ A key fact related to the unequal resource access is that Israeli's consume per capita, four to five times as much water as Palestinians, Syrians, and Jordanians.³² This is a source of considerable consternation on the part of the latter three.

Contributing to Israel's water problems in the region is the Gaza Strip. Projections are that Gaza's water will be unusable by the year 2000, when its population will reach nearly 1 million.³³ With such limited resources available, Israel can ill afford to redirect water to the Gaza area despite the security benefits the region affords it.

To summarize the water scarcity problem for Israel, consider this projection: Israel's current 200 mcm annual freshwater deficit will approach 900 mcm between the years 2015 and 2020.³⁴ Additionally, the water sources in the West Bank currently

provide approximately 25 percent of the total annual water supply of Israel.³⁵ Faced with a staggering water deficit in the future, securing long term access to West Bank water will remain a clear goal in Israeli national security policy development.

Jordan

The water problems facing Jordan are certainly the most severe in the basin region. This is much the result of the fact that a much larger percentage of the country is desert, and receives very little rainfall. Jordan depends on the Lower Jordan and Yarmuk Rivers for the majority of its surface water. However, the Lower Jordan contains a high degree of salinity and cannot be used for agricultural purposes. In fact, over the years it has become little more than a drainage ditch. Consider that on an annual basis during the 1950's the river released some 500 mcm, but by the late 1980's this flow had been reduced to less than 50 mcm of water.³⁶

The largest percentage of Jordan's water comes from the Yarmuk River, a previously discussed tributary to the Jordan. However, Jordan is not able to exploit the majority of its flow, as much of its yield is in the form of winter floodwaters. Jordan has no natural reservoir to capture to store these floodwaters. The Jordanians have pushed for efforts to build the Wahda (Unity) Dam on the Yarmuk in an attempt to capture these floodwaters, but Israel has blocked these efforts.

Jordan has sought financing from the World Bank to construct the dam, however the World Bank has denied funding unless Jordan, Israel, and Syria all agree on the construction. Israel has withheld its approval, seeking their fair share to the water. Israel

receives less than 3 percent of its annual water from the Yarmuk, but feel their growing water demands are threatened by the construction of the dam.³⁷

A principal problem for Jordan is the fact that the Yarmuk River originates in Syria. The Syrians over the years have built a number of dams on the Yarmuk to make use of its flow. These dams further exacerbate Jordan's water problems. Additionally, Jordan does not have the luxury of groundwater to exploit as Israel does. Jordan is only able to draw between a third and one-half of their water potential from groundwater sources, compared with Israel's three-fifths.³⁸

Jordan's annual population growth is currently one of the highest in the world at 3.8%, an issue that only aggravates further its water scarcity problems. It is currently projected that by the year 2000, Jordan water requirements will exceed its renewable supply by some 20%.³⁹ The key issue is that for Jordan to gain greater access to the Jordan River will result in a proportional decrease in water supply to Israel.

Syria

Although Syria does not currently face a current water shortage, its situation in the region is tenuous at best. Continued water project efforts on the Yarmuk by Syria will only serve to raise the concern of Israel and Jordan. Although Syria has an alternative water source in the Euphrates River, it is a downstream riparian to Turkey (This situation will be discussed further in the Tigris-Euphrates case study).

A major political goal of Syria's in the Jordan River basin is the return of the Golan Heights captured by Israel during the 1967 War. However, a settlement with Israel

will require a balancing of Syria's desire for control with Israel's overall security goals to include water and a comprehensive peace.

The West Bank

Negotiations concerning the hand-off of the West Bank to the Palestinians continue at the time of this writing, with no firm date set for complete Israeli withdrawal. Water will unquestionably be a major player in the negotiated settlement. As previously mentioned, Israel receives approximately 25% of its water supply from aquifers located in the West bank. The total forfeiture of a supply source of this magnitude by Israel is unlikely.

Currently approximately 5% of the water taken from West Bank aquifers supports the West Bank, with 95% supporting the nation of Israel. There is considerable inequity, warranted or not, in the water allocations within the West Bank. The Arab settlers receive 137 mcm to support population of 1 million, while 100,000 Israelis in the West Bank share 100 mcm.⁴⁰

With the water situation in the Jordan River Basin evaluated, it is time to examine water issues in the Tigris-Euphrates basin.

CHAPTER 3

THE TIGRIS-EUPHRATES RIVER BASIN

The Tigris and Euphrates Rivers both originate in the mountains of Turkey and flow south through Syria and Iraq before draining into the Persian Gulf. The Euphrates River is geographically better postured to support the three nations as it tends to flow

centrally through each. Consequently it has become the primary focus for water development and conflict with the basin region.

Despite the fact that only 28 percent of the Euphrates River falls within Turkish territory, some 90 percent of the Euphrates flow originates in Turkey. The remainder of the Euphrates flow originates in Syria, with Iraq contributing nothing to the river's flow. The basin provides 40 percent of Turkey's total annual water supply, 80-85 percent of Syria's, and 98 percent of Iraq's.⁴¹ The critical relationship between riparian position (up-river or down) and the percentage of water supply provided by the Euphrates, quickly brings the water issue into focus.

Central to a discussion of the Euphrates Basin is Turkey's massive water development efforts. Seizing on their geographic positioning on the Euphrates, Turkey has initiated a complex water development effort. Its Grand Anatolia Project (GAP) includes plans to develop 10 dams on the Euphrates and 12 on the Tigris. Turkish efforts along the Tigris are principally geared toward the production of hydroelectric power because of the steep and rugged terrain along its flow within Turkey. Forecasts concerning the full implementation of GAP predict a 40 percent cut in Syria's permanent share of the Euphrates and up to 80 percent of Iraq's.⁴² A further discussion of water development efforts in the region will take place when each country's water scarcity issues are addressed. However, it is important to now note the tendency is for these developments not to be coordinated with the other riparians. Currently, the storage capacity of reservoirs built or planned by Turkey (90 billion cubic meters), Syria (15 BCM), and Iraq (10 BCM) far exceed the 74 BCM flow of the Tigris and Euphrates

ivers.⁴³ This excess storage capability is a direct result of the lack of trust among the three countries.

Water quantity is not the only water issue within the basin however, as water quality is being directly impacted by withdrawals and irrigation flows. Return flow, low-grade water, will “eventually constitute some 40 percent of the Euphrates flow to Syria and 25 percent of the Tigris flow to Iraq. Syria will continue to degrade the water to the Euphrates by shipping its own return flow to Iraq and some 50 percent of the flow to Iraq will be return flow by 2030.”⁴⁴ A large portion of this return flow will contain high concentrations of agricultural chemicals and salts. Clearly the water issues for Syria and Iraq go beyond quantity.

History of Conflict in the Basin

Negotiations over the Euphrates flow have taken place between Turkey, Iraq, and Syria for over thirty years. However, no lasting agreement has been reached by the three. Contributing to this fact is that relations between the three have been all over the spectrum. Consider that Iraq and Syria have long opposed Turkey’s NATO membership, but Syria and Turkey teamed together to protest Iraq’s military aggression over water in the 1970’s. The 1980’s brought Turkey and Iraq together to denounce Syria’s support to PKK guerrilla operations in their countries. Then, during the Persian Gulf War in 1991, Turkey and Syria joined the allied coalition against Iraq’s invasion of Kuwait.

The dispute over water between the three first developed in the early 1960’s with Turkey and Syria creating large scale withdrawal and development plans. During 1965, trilateral discussions were held in an attempt to address each of the countries’ demands.

However, the water demands of the three exceeded the flow capacity of the Euphrates. Bilateral discussions between Iraq and Syria also took place during this period, but no formal agreements were reached by the end of the decade.

In the spring of 1975, Syria's filling of the Tabqa Dam on the Euphrates almost brought Syria and Iraq to the brink of war. Iraq asserted that the Syrian dam had reduced the flow of the Euphrates into its territory. As a result, Iraq threatened to bomb the dam and massed troops along its border with Syria. Both nations traded hostile statements in the press, with Iraq threatening to take any action necessary to protect the flow of the Euphrates. Iraq's protests included a formal protest to the Arab League. Syria responded in May 1975 by closing its airspace to all Iraqi aircraft, terminating Syrian flights into Baghdad, as well as transferring troops from its front with Israel to the Iraqi border. Violent conflict was prevented by Saudi Arabian mediation.⁴⁵

In the 1980's conflict over water in the region continued. In 1986, it is reported that Turkey uncovered a Syrian plot to blow up the Ataturk Dam.⁴⁶ In 1987, Turkey hinted at cutting Syria's flow of the Euphrates in an effort to discourage Syria's support of the PKK.⁴⁷ In October 1989, Syrian MIG's flying a training mission shot down a Turkish survey plane flying well within Turkish airspace, and the attack was linked to Turkish-Syrian water tensions.⁴⁸

Water related tensions in the region were significantly increased with Turkey's filling of the Attaturk Dam in early 1990. In order to fill the dam, Turkey had to stop the flow of the Euphrates into Syria and Iraq for a month. Despite the fact that Turkey provided its down-river neighbors with advanced warning, both Iraq and Syria

vehemently protested the stoppage. To Syria and Iraq, it became crystal clear that Turkey maintained a water weapon in the Euphrates.

The role of water was also linked with the Persian Gulf War of 1991. Reportedly, there were discussions within the United Nations of the possibility of using Turkish dams to stop the flow of the Euphrates to Iraq in response to its invasion of Kuwait.⁴⁹ No action was taken on this course of action, but its mere discussion provides a clear example of the role water can play in the region.

With an overview of water related conflict in the region established, it is now appropriate to investigate the issue of water as it relates to each of the three riparians.

Turkey

Of all the Middle Eastern countries that this monograph will discuss, Turkey easily has the most abundant water supply. Estimates indicate that Turkey's annual water supply will be triple that of its consumption after the year 2000.⁵⁰ Contributing to this water surplus in the future is the fact Turkey's current population is growing at a moderately high 2.3%, and it aims to reduce this growth to 1.8% by the year 2000.⁵¹

Turkey's water development efforts are driven by a desire to be an exporter of food, as well as a desire to increase its capabilities in the industrial/manufacturing arena. Improvements in these two areas will go far to achieving an enhanced standard of living for its people as well as recognition as a major power not only in the Middle East but Europe as well.

Turkey's political leadership, by coincidence or otherwise, has had direct links to the GAP. Turgut Ozal, the late President, was an electrical engineer who served as the

country's deputy director of the Electrical Studies and Research Administration. It was in this capacity that Ozal witnessed firsthand the incredible potential for harnessing the hydro-electric power of the Euphrates. Additionally, Suleiman Demirel, a former Prime Minister under Ozal and current President of Turkey, is a hydrological engineer who as the Director of the State Hydraulic Works became known as the "king of dams".

Though both leaders understood the significant impact of the GAP, their exploitation of the project differed. On the day the first generators of GAP were started, it was Ozal that insisted that the Syrian and Iraqi ministers be invited to the gala event. At a press conference the day before the event Prime Minister Demirel possibly showed his true colors when asked of the impact of GAP on Turkey's neighbors. He responded by saying, "The waters spring in Turkey. This is a matter of sovereignty. Water resources are Turkey's, and oil is theirs. Since we don't tell them, 'Look we have a right to half your oil, they cannot lay claim to what's ours.'"⁵²

Through the GAP, with its system of dams previously discussed, Turkey hopes to improve its industrial capacity at the same time increasing the standard of living in the rural southeastern region. The Turkish intent is to harness the Euphrates flow to provide irrigation necessary to improve the agrarian efforts in the southeastern Turkey as well as to produce hydro-electric power to support the nation's industrial growth.

The amount of hydro-electric power that Turkey expects to harness from the flow of the Tigris and Euphrates Rivers is impressive. Projections are that Turkish plans in the hydro-electric arena will provide them a nearly 70 percent increase from its current power production capability.⁵³ As a result Turkey is likely to become an energy exporter,

rather than merely a consumer. Currently, Turkey's average per capita consumption of energy is less than half the world average of 2200 kwh.⁵⁴ This influx in energy potential will not only fuel Turkey's efforts at an improved industrial infrastructure, but will likely also increase its bargaining position from an energy standpoint with its neighbors.

The six provinces targeted for development as a result of the GAP are among Turkey's poorest. The region, along Turkey's borders with Syria and Iraq, is sparsely populated with a population of less than 6 million people and approximately twice the size of the Netherlands.⁵⁵ Approximately two-third of the inhabitants of the region rely on farming as a livelihood. The issue that makes this region critical to Turkey is its ethnic make-up. Approximately half of the inhabitants are ethnic Kurds, and the militant separatist group among them (PKK) have laid claims to residing in what they believe is rightfully Kurdistan. This issue of sovereignty for the Kurds has caused Turkey much conflict in the region since boundaries were drawn on a map following World War I.

The Kurds' call for sovereign recognition and Turkey's desire to ignore their efforts have produced a region of near lawlessness. In the past Turkey has been forced to rely on force to keep stability in the region. In fact, the death toll related to the Kurdish conflict in the region was estimated at more than 19,000 in July 1995.⁵⁶ Complicating the Kurdish problem for Turkey has been Iraq and Syria's support of the PKK operations. Turkey has raised the issue of support to the Kurds by Syria and Iraq in a number of discussions with the two nations concerning the flow of the Euphrates.

Turkey clearly is making an attempt to negate the PKK's efforts by reducing the economic plight of the Kurds but by also encouraging the movement of ethnic Turks into

the region. Kurdish nationalists are not encouraged by Turkey's efforts to subvert them to Turkish rule. They likely fear the region will develop along the lines of Kurdish camps established in northern Iraq, allowing for greater Turkish regulation of the Kurdish region.

Although Turkey's GAP appears to be a conscious effort to improve the living conditions and the economic stance of its country, it also appears as a significant threat to the same of Syria and Iraq. With Turkey's water situation outlined, it is now appropriate to investigate the situation of its down-river neighbor Syria.

Syria

Syria does not currently suffer a water shortage, but its dependence on the Euphrates River places its future water supply at risk. Presently, the Euphrates provides Syria with a water flow of approximately 30 billion cubic meters (BCM) of water annually, compared to only 3-4 BCM it receives from other sources.⁵⁷ As previously mentioned, projections are that with the completion of the GAP, Syria's share of the Euphrates flow is likely to be reduced by some 40%.

Contributing significantly to Syria's water problems in the future is its staggering annual population growth of 3.6%. It is projected that Syria's current population of 14 million will nearly double within the next twenty years.⁵⁸ The country has encouraged maintaining a high growth rate believing it adds to the nation's strength and as a result a powerful position in the Arab World. However, the combination of a spiraling population growth and a threatened water supply from the Euphrates places Syria in an

obvious water scarcity situation in the future. Any greater demands placed on the Euphrates by Syria will only reduce the river's flow into Iraq.

Currently Syria uses some 90 percent of its water to support agricultural efforts within the country.⁵⁹ While agriculture used to provide the bulk of Syria's exports, it is quickly being replaced by oil. This trend will need to continue in an effort to offset the economic impact of water shortages.

Hampering Syria's efforts to improve its economic position is its hydro-electric capability. The Tabqa Dam on the Euphrates was to be Syria's centerpiece water development project. Opened in 1973, the facility has suffered from lowered water levels in the Euphrates. This problem was highlighted in 1989, when the facility was reported to be operating at approximately 10 percent of capacity because of the reduced flow.⁶⁰ This unreliable source of electrical power has proven quite a problem for Syria. In the summer months Syria's major cities of Damascus and Aleppo suffer numerous blackouts.

A factor directly impacting Syria's relations with Turkey, and as a result its water situation, is Syria's record of support to the PKK. In the late 1970's President Assad recognized the possible leverage he could achieve against Turkey by supporting the efforts of the PKK. First training camps were offered north of Damascus and later in the Syrian occupied Bekaa Valley in Lebanon. Syria supplied the PKK with safe houses, financial support, training, and arms. In return the PKK provided Syria a proxy force with which it could influence Turkish affairs.⁶¹ Although the majority of PKK

basecamps have since repositioned into northern Iran, the Turkish government still suspects Syria of supporting PKK operations.

Syria's heavy reliance on the Euphrates, spiraling population growth, and Turkey's GAP interact to threaten Syria's water situation in the future. As a down-river riparian, Syria is in an unfavorable position to Turkey when it comes to the flow of the Euphrates. Syria's past support to the PKK has been in an effort to level their position in dealing with Turkey. However any future bilateral agreements between the two, as well as future Syrian water developments concerning the Euphrates, will likely be at the expense of lower riparian Iraq.

Iraq

As a result of its geographic position, down river to Turkey and Syria along the Euphrates, Iraq will experience the greatest impact from the GAP efforts. As previously mentioned, Iraq faces an 80 percent reduction in the flow of the Euphrates upon completion of the project. Additionally, the water quality of the Euphrates will continue to worsen as a result of the water development efforts upstream.

The Persian Gulf War in 1991 dealt Iraq's water development efforts a tremendous setback. Only one major water project survived the conflict relatively unscathed. As a result, Iraq has faced negative consequences in energy and food production, as well as in its supply of drinking water. Food rationing and water trucks on the streets of Iraq are the result of Iraq's defeat at the hands of coalition forces. Additionally sanctions and the cost of repairing a severely damaged infrastructure have greatly reduced Iraq's available capital to invest in water development projects.

Despite the dim prospects centered on the flow of the Euphrates, Iraq has several projects in the planning stages along the Tigris River. Turkey's up-river exploitation of the Tigris is principally centered around hydro-electric power production, with only limited irrigation use. As a result, exploitation of the Tigris is likely Iraq's best source of water for the future. The completion of the Tharthar Canal project will provide Iraq the capability of diverting water from the Tigris into the Euphrates where it can better support Iraq's needs. This will help to negate losses from upstream withdrawals of the Euphrates by Syria and Turkey.

Iraq's state encouraged growth rate of 3.9 percent contributes to its problems in the water arena. Traditionally, subsequent to the Persian Gulf War, Iraq had imported some 70 percent of its food supplies.⁶² However, economic sanctions imposed both during and after the Gulf War have persuaded Iraq to attempt to become self-sufficient in providing for its food requirements. This decision in turn places a greater strain on the country's water resources. Projections are that by the year 2000, Iraq will divert approximately 90 percent of its water supply to agriculture.⁶³ Balancing the desire for self sustainment, a state encouraged high rate of population, and a seemingly ever increasing reduction in water supply will clearly be a daunting task for Iraq to face in future years.

With an understanding of water conditions within the Tigris- Euphrates River Basin, it is now appropriate to examine the last of the three Middle East case studies, the Nile River Basin.

CHAPTER 4

THE NILE RIVER BASIN

Although typically thought of as one continuous river, the Nile actually consists of the flow of two distinct rivers the Blue and the White Nile. The headwaters of the White Nile form in the East African highlands of Burundi and drain into Lake Victoria. The river then flows through a series of lakes in Uganda before reaching the Sudd swamplands in southern Sudan. In filling these swamplands at least 50 percent of the river's flow is lost.⁶⁴ The Blue Nile flows from the highlands of Ethiopia and merges with the waters of the White Nile at Khartoum.

The Nile River is the longest river in the world. Its waters reach a total of nine nations: Egypt, Sudan, Ethiopia, Uganda, Kenya, Tanzania, Rwanda, Burundi and Zaire. This case study will focus on water issues associated with Egypt, Sudan, and Ethiopia. This is a result of the fact the other East African nations to date do not exploit significant amounts of water from the basin and their economic and technical means do not support efforts to do so in the near future. Additionally, these nations are geographically positioned along the White Nile, which normally accounts for 15-20 percent of the united Nile's flow into Egypt.⁶⁵ The Blue Nile, passing from Ethiopia and Sudan accounts for the predominance of the united river's flow into Egypt. As a result it is the nations of Egypt, Sudan and Ethiopia that come to the forefront in analyzing the relationship between water and conflict in the Nile Basin.

The Nile River Basin provides an interesting situation for study in that the nations that contribute the greatest to the flow of the river, place the smallest demands on that

flow. Ethiopia which contributes 80 percent of the flow of the Nile, only exploits some 10 percent of its flow. Conversely, Egypt (contributing nothing to the river's flow) and Sudan (contributing very little) by far are the greatest users of the Nile flow. In fact Egypt relies on the Nile to satisfy some 95 percent of its annual water requirements.

Clearly, Egypt is not only the military power but the economic power in the region as well. Its per capita gross national product is twice that of Sudan and more than five times that of Ethiopia.⁶⁶ As a result, it comes as no surprise that Egypt has led the way in water development. The problem for Egypt arises from its lower riparian relationship with Sudan and Ethiopia.

Contributing to the volatility of the Nile Basin situation is the lack of an agreement binding all of the riparians. The only binding treaty concerning allocation of the Nile was a bilateral treaty signed in 1959 by Egypt and Sudan. The agreement allocated 55.5 BCM to Egypt and 18.5 BCM to Sudan.⁶⁷ To date, Sudan has yet to use its full share of this allocation and has allowed Egypt to use more than its allotted share. Additional use of the river's flow by any of the upper riparians, particularly Ethiopia (controls the flow of the Blue Nile), could reduce the flow available to lower riparians and greatly increase the tensions over water in the basin.

As in the previous two case studies, population growth in the Nile Basin is a problem. In fact, the growth statistics related to the Nile Basin are the most severe of the three, despite the fact that Sudan and Ethiopia have both suffered through famine and civil wars. Consider the following numbers: in 1987 there were approximately 117 million people residing in Egypt, Sudan, and Ethiopia; by the year 2000, the total is

expected to reach 166 million; and by 2025 the total is projected to reach the incredible total of 277 million. Equally alarming, particularly for Egypt, is that if present trends continue Ethiopia's population will transition from being 10 percent less than Egypt to 20 percent greater than Egypt by 2025.⁶⁸

History of Conflict in the Basin

The Nile River Basin has been relatively free of water related conflict in modern times. However, the undertones have been present. As mentioned in the introduction, former Egyptian Foreign Minister and UN Secretary-General Boutros-Boutros Ghali has predicted the next war in the Middle East region will be over the waters of the Nile. Additionally, concern for Egypt's water security led the late Egyptian President Anwar Sadat to say in 1979, "the only matter that could take Egypt to war again is water."⁶⁹

Perhaps an indicator of Egypt's water sensitivity, and as a result penchant for conflict over water in the basin, is revealed in Saddat's assassination in 1981. It has been reported that during talks leading to the peace treaty signed by Israel and Egypt in February 1979, there was discussion of the possibility of Egypt diverting 1% of the Nile's flow to irrigate the Negev desert of Israel.⁷⁰ It would be very difficult to distinguish which was less palatable for Egyptians, making peace with Israel and potentially alienating themselves within the Arab world, or the concept of diverting a portion of the precious flow of the Nile to Israel. In the end for Sadat it was quite likely a combination of both that brought his demise.

Egypt and Sudan found themselves on opposite sides during the Persian Gulf War in 1991, with Egypt siding with coalition forces and Sudan firmly standing behind

Saddam Hussein. Additionally, Egypt fears the overflow of radical Islam from Sudan as well as Sudan's support for Islamic opposition groups within Egypt.

Despite the occasional saber rattling by Egypt, and its periodic accusations against Israel assisting Ethiopia in water development schemes along the Blue Nile, the basin has so far avoided armed conflict. In the continuing effort to assess the potential for future conflict in the basin, it is now appropriate to investigate the water scenarios within the three riparians, beginning with Egypt.

Egypt

History provides an indication of just how severe the water situation is for Egypt. The Nile has sustained civilizations for more than 5,000 years, but evidence suggests that the populations of ancient Egypt never exceeded 1.5 million to 2.5 million people.⁷¹ Currently Egypt uses the same limited water source to support a population of over 60 million. To make matters worse, the population of Egypt grows by a million people every nine months.

Almost totally dependent on the Nile for its water requirements, Egypt freely acknowledges the impact of the Nile on its nation's security. Reportedly, any threat to the Nile "allows the Egyptian High Command (armed forces) to order an immediate military response, without having to wait for Parliamentary approval."⁷²

The centerpiece of Egypt's water development efforts on the Nile is the Aswan Dam. Construction of the dam began in 1960, with the final stage completed in 1970. The dam was constructed without consultation with Egypt's upper riparians. The main purpose of the dam, as stated by President Nasser at the time, was to allow Egypt to "no

longer be the historic hostage of the upper partners to the Nile basin.”⁷³ The dam would allow Egypt to control flooding of the Nile; provide Egypt with a relatively stable water supply negating the effects of drought or low river levels; and to generate electricity for Egypt’s industrialization efforts.

The dam produced Lake Nasser, the largest man-made lake in the world. The first few years following the construction of the dam, the waters of the Nile flowed abundantly, and by 1978 (the same year consideration was given to diverting water to Israel) the volume of flow reaching the dam was approximated at 110 BCM. However, the water glut would not survive the drought of the 1980’s. By 1987, a mere 24 BCM of water was available in the Nasser reservoir, providing for less than half of Egypt’s normal annual water requirements.⁷⁴

Although the reservoir returned to normal levels following heavy rainfall and watershed in August 1988, the drought had a major impact on how Egypt viewed the Nile. Its flow could not be taken for granted, and security of the Nile would take its place among the highest of national security priorities.

Currently, an average of 57 BCM of water is annually released by the Aswan Dam. Of this amount some 33 BCM is consumed by Egyptian agriculture, 2 BCM by municipal and industrial activities, 2 BCM evaporates downstream, and approximately 20 BCM are released for power generation and drainage.⁷⁵ As so many other countries previously discussed, Egypt is trapped in a very difficult dilemma when it comes to supporting agriculture. Despite the fact that Egypt has long been reliant on food imports to sustain itself and it has made greater strides than its neighbors towards

industrialization, some 35 percent of the Egyptian work force still find employment in the agricultural sector. Further or increased diversion of Egypt's limited water supply to support agricultural aims to support this sector increasingly threatens the availability of the supply itself.

Contributing to Egypt's water supply problems is its extremely inefficient distribution system. Estimates are that two-thirds of the water allocated to non-agricultural use is lost, and that Egyptian farmers use twice the amount of water necessary because of poor irrigation techniques.⁷⁶ Egypt has shown considerable concern for increasing its supply of water, but has placed little effort to improving its efficiency of use.

From this discussion of Egypt's water related issues, it is now time to move up the Nile River to gain insight into Sudan's water situation.

Sudan

Similar to Egypt, Sudan is almost totally dependent on the flow of the Nile for its water supply. As previously discussed, it is within the borders of Sudan that the Blue and White Nile merge in the vicinity of Khartoum. As a result, Sudan is in a riparian position to exploit access to the full flow above Egypt's Aswan Dam. However, years of civil war have deprived the country of the ability to take any distinct advantage of its geographical positioning.

Despite the fact that Sudan currently uses less than its allotted allocation of the Nile flow as prescribed in the 1959 Agreement, the country has found itself opposing Egypt on a number of issues. Probably the most contentious issue is the Islamic

movement that has manifested itself within the borders of Sudan. Egypt has its own fundamental Islamic movement and fears that men and arms could flow across the border from Sudan and further foment the movement. Another contentious issue between the two nations centers on a border dispute in the Halaib region along the Red Sea. The issue came to the forefront in 1991, when Sudan signed an exploration concession with a Canadian petroleum firm to begin exploration in the region. The region remains in dispute today.

Sudan also found itself opposite Egypt in its support for Saddam Hussein's invasion of Kuwait. Even before Iraq's invasion, Egypt's President Mubarak accused Sudan of positioning Iraqi missiles in Sudan aimed at the Aswan Dam.⁷⁷

Sudan's links with Iran and its Islamic movement, also continue to cause Egypt concern. It is reported that Sudan's Islamic government recently signed a comprehensive trade-agreement with Iran. The agreement calls for Iran to deliver 100,000 barrels of oil to Sudan as well as to pay for much of the government's military expenditures to defeat the southern rebels involved in Sudan's civil war.⁷⁸ Sudan's relationship with Iran only further exacerbates Egypt's paranoia concerning the further spread of radical Islam.

Despite the differences displayed the two nation's, both have resisted bringing water into the equation. It appears the two nations are willing to set aside their lower level disagreements in an effort to maintain focus on the higher security issue, that being the management of the available flow of the river they are both so dependent.

As has become the norm in the region, Sudan allocates approximately 80 percent of its Nile withdrawal to the agricultural sector. This sector supports 61 percent of the

workforce, is responsible for 35 percent of the nation's GDP, and 95 percent of the nation's exports.⁷⁹ Years of civil war have robbed Sudan of the ability to not only develop water projects along the Nile, but also the ability to reduce its economic reliance on water demanding agricultural efforts.

The study of the potential for water conflict in the Nile River Basin, concludes with a look at the water situation in Ethiopia.

Ethiopia

The headwaters of the Blue Nile, and as a result 80% of the total flow of the Nile at the Aswan Dam, originate in Ethiopia. This geostrategic positioning allows Ethiopia to influence down riparians Sudan and Egypt. Ethiopia has discussed a number of water projects in the past, however prolonged civil war, much like Sudan, has severely limited its ability to follow through on these projects. Following seventeen years of military backed socialist rule, Ethiopia was able to establish a democratic government in 1991. This placed Ethiopia on the road to economic recovery, and as a result their water requirements will likely increase in the future.

Ethiopia's population is expected to grow from 54 million in 1992 to 94 million by 2010.⁸⁰ To support this growth and to increase industrialization, urbanization, and agricultural production, Ethiopia will require access to increasing amounts of the Blue Nile. However, it will likely require considerable foreign aid to jump-start its water development efforts. It is precisely the potential source of this foreign aid that greatly concerns down riparian Egypt.

A potential contributor in Ethiopia's efforts in water development is Israel.⁸¹ Israel has had links to Ethiopia dating back to the Marxist regime, and could see the potential for influencing Egypt through Ethiopia's positioning on the Blue Nile. By supporting Ethiopia's water development efforts, Israel has the ability to place political pressure on Egypt. This could come in the form of previously discussed release of Nile waters to Israel by Egypt, or simply an effort to co-op Egypt in future Israeli security decisions concerning the Middle East.

In the near term, Ethiopia is likely to be a low threat to its down riparian neighbors Sudan and Egypt. However, in the coming years this situation is clearly subject to change. To date, Ethiopia has been left out of water agreements with Sudan and Egypt, and as a result is moving forward with its own interests in mind.

Now that the three case studies related to the potential for water related conflicts in the Middle East have been outlined, it is time to assess the conflict potential associated with each of the three river basins.

CHAPTER 5

CONCLUSIONS

As previously discussed, the three-year project lead by Thomas Homer-Dixon determined there were three conditions that contributed to eruption of violent conflict as a result of environmental scarcity. These three conditions were: decreases in quality and quantity of renewable resources, population growth, and unequal resource access. The three Middle East case studies analyzed by this monograph all present evidence of meeting these three conditions. However, it is evident that these conditions are not

equally present in each of the three. As a result, it is possible to assess the potential for water related conflict among the three basins.

Homer-Dixon's three factors are most clearly manifested in the Jordan River Basin. It is only in the Jordan Basin where a water shortage currently exists. This places the region under the spotlight for having the greatest potential for water related conflict. The considerable degradation of water quality and population growth, particularly in Syria and Jordan, in the basin also contribute to its identification as the most likely region for water related conflict.

As a result of Israel's dominant military strength and its position as an upper riparian in the region, a direct confrontation with Jordan or Syria is unlikely. Jordan's recent efforts at affecting peace with Israel, especially reduce its potential for conflict. The most likely scenario for violent water related conflict in the basin, is between Israel and the Palestinians. From the Jordan Basin case study, it is evident that the unequal water access between Israel and the Palestinians in the West Bank is acute.

Israeli Prime Minister Benjamin Netanyahu has taken an extremely cautious and conservative approach in dealing with the Palestinian situation. The recent state supported construction of Israeli residences in East Jerusalem is likely an indication of Netanyahu's resolve to remain directly engaged in the control of Palestinian situation in the West Bank. Without improvement in the water fate of the Palestinians, at least two clear scenarios for water related conflict appear. The first is for increased violence in the West Bank between the Palestinians and the Israeli's. Without any progress to show for his efforts at a seeking a peaceful solution to the Palestinian's problems, PLO Leader

Yasser Arafat may be forced once again to violence as a solution. Arafat must be able to show some tangible evidence of progress from his peace efforts to retain leadership of the PLO. Without progress, there will be increased pressure within the PLO to return to violence as a means of extracting its demands from Israel. A response of this sort by Arafat would be in classic Homer-Dixon style of a hard-lined regime.

Another possible water related conflict scenario is one that would result in the Arafat's replacement as leader of the PLO. A lack of progress by the PLO in its attempts to secure an improved water equity relationship with Israel, could lead to a "coup d'etat" within the organization. This road to conflict was previously addressed in discussions of the Homer-Dixon framework, and is also supported by the work of Crane Brinton in the *Anatomy of the Revolution*. Brinton discusses the problem a moderate government faces in its attempts to address the living conditions following a government revolution.⁸² During the passage of time, if the moderate government is unable to improve the revolutionary conditions, it is attacked by extremists seeking greater progress. This revolutionary scenario within the PLO is quite possible if Arafat is faced with a continued lack of progress in his dealings with Israel in the future.

Of the three case studies, the next region most likely to witness water related conflict is the Tigris-Euphrates Basin. The control that Turkey exerts over the basin with the GAP is clear for lower riparians Syria and Iraq. Similar to Israel's position in the Jordan Basin, Turkey is in a favorable position from a military as well as water standpoint. As a result, direct violent conflict between Turkey and its lower riparians is

unlikely in the near term. The more likely connection between water and violent conflict is between the PKK and Turkey.

Turkish water development efforts in the southeast Anatolia region are viewed by the Kurds as an effort to assimilate their people into the Turkish nation. This effort runs contrary to the desires of the Kurds in the region. As a result of the Kurdish perception of the GAP, attacks by the PKK against GAP development projects are quite possible. Military action taken by the PKK on its own behalf would not be a result of water scarcity, and as a result outside the purview of the Homer-Dixon framework. Such military action, however, would clearly be water related.

Syria, Iraq, and Iran as well, have shown great willingness to support PKK operations in Turkey in the past. It is quite likely that Syria and Iraq will use the PKK as their proxy to counter Turkish threats to their access to the Euphrates. This scenario would not include large scale military action, but would likely include terrorist type attacks versus dams and other Turkish water development projects.

Another water related conflict scenario arises with the recent emergence of an Islamic led government in Turkey. The Turkish military has long been the secular force within the country. If the newly appointed Islamic government was to sign security threatening water agreements with its Islamic riparians, the potential for the Turkish military to intervene in internal government matters is quite possible.

The Nile River Basin is the least likely of the three case studies to produce violent conflict in the near term, despite Boutros-Boutros Ghali's claims to the contrary. Currently Sudan and Ethiopia are not in a situation economically to threaten Egypt's

access to the Nile. Additionally, Egypt is clearly the military power in the basin and no match for Sudan or Ethiopia. However, the basin clearly has potential linkage to conflict in the threatening situation related to the Jordan Basin. Israel's efforts in aiding Ethiopian water development could place Egypt in a position to choose between providing for Israel's desires for Nile water and violent conflict with either Ethiopia or Israel. Violent conflict with Israel would likely involve other members of the Arab League, and not unilateral action by Egypt.

Violent conflict between Egypt and Sudan over water is unlikely based on their past relations on the issue. However, these two nations could find themselves involved in a conflict with Ethiopia, if the latter finds financial support for water development schemes on the Blue Nile.

As is evident from the conflict scenarios discussed here, near term water conflict is more likely to be subnational (PLO vs. Israel and PKK vs. Turkey) rather than between nations. However, there is clearly potential for violent conflict to reach beyond these levels in future decades. Spiraling population growth will place increased demands on drinking water in the region. However, more importantly this increased population will require increases in food production, which will require disproportionate increases in the water requirements for agriculture.

The desire for food self-sufficiency is a national security goal that few nations in the Middle East are willing to relinquish. Additionally, urban areas in the region are ill-prepared for the migration that would result from a deemphasis on agriculture. This migration from the countryside to the city would place governments under extreme

pressure to provide suitable living conditions. An inability to provide for these needs would like result in the fracturing of governments and nations. Another option is to resort to violent conflict to secure or increase water access.

In the arid Middle East, water is a critical strategic resource. One that lies at the root of its existence. As a result, an understanding of current water scarcity conditions in the region can provide an analyst or decision-maker with an extremely credible indicator for the development of violent conflict in the region.

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